

## NOTES

THE TAXONOMIC PLACEMENT INTO SECTION OF TWO MEXICAN SPECIES OF *ASTRAGALUS* (FABACEAE)—At the completion of his revision of North American *Astragalus*, Barneby (1964, pp. 1156–1158) was compelled to leave seven binomials as “doubtful and imperfectly known species.” Two of these, *Astragalus daleae* Greene and *Astragalus hartmanii* Rydb., were considered by Barneby to represent “good” species and were described with the detail of the others in his treatment. However, because the fruit is essential for subgeneric alignment of *Astragalus* species, and specimens available to Barneby were only in flower or in early fruit, he was obliged to omit the species from his subgeneric classification, to append them at the end of the taxonomic revision, and to simply suggest their probable close relatives. Recent collections from the northern Sierra Madre in Chihuahua and Durango, Mexico, now allow the descriptions of *A. daleae* and *A. hartmanii* to be completed, and the species to be subgenerically classified.

*ASTRAGALUS DALEAE*. Two collections have pods that are mature. The first is from the vicinity of the type locality: *Ripley & Barneby* 14,187, Durango, 20 mi W of El Salto, 8600 ft elev, 18 Oct 1965 (NY). The second extends the known range about 210 km northward: *Spellenberg & Zimmerman* 6715, Durango, 111 road mi NW of Santiago Papasquiaro, 2420 m elev, 19 Sep 1982 (ESAHE, ID, MEXU, NMC, NY).

The deflexed, tardily disjointing pods are narrowly lanceolate or linear-oblong in profile, from straight to evenly curved through 45° along the ventral suture, 7–12 mm long, about 2 mm in diameter, rounded at the base, contracted at the apex into a short, erect, cusp-like beak, triquetrously compressed, carinate ventrally by the ventral suture, sulcate dorsally, the lateral faces gently convex, the lateral angles abruptly rounded, the thin, pale green, white- or partly black-strigulose valves becoming stiffly papery, at first stramineous, but eventually darkening to almost black, inflexed as a complete septum; dehiscence apical and downward through the ventral suture, and ultimately through the septum. Seeds olive-brown, 1.5–1.6 mm long, smooth, sublustrous.

Barneby suggested that the relationship of *A. daleae* was with section *Micranthi*, and compared it directly with central Mexican *Astragalus hartwegii* Benth. The pods of *A. daleae* substantiate this relationship, but in size and shape they are more similar to those of *Astragalus vaccarum* A. Gray (also section *Micranthi*), a species occurring mostly at lower elevations to the east and north of Durango. The strong similarity of *A. daleae* to both



these species readily places it in section *Micranthi*, where it differs from its congeners primarily by its comparatively large, herbaceous floral bracts.

*ASTRAGALUS HARTMANII*. This species is distinctive by its large, narrow, ascending flowers. Until recently it was known from a single collection with only flowers made in 1891 near the San Diego Ranch by Hartman, a collector associated with the Lumholtz Archeological Expedition to northwestern Mexico. Based on Lumholtz's journals and present day maps, the type locality was estimated by Barneby (pers. comm.) to be a few miles southwest of present-day Viejo Casas Grandes, Chihuahua.

The species was rediscovered 21 kilometers upstream from the now delapidated Hacienda San Diego mansion on the Río Piedras Verdes in 1979 by an ornithology student, Wm. Baltosser, who was studying feeding habits of hummingbirds. He documented his work with voucher specimens, and among them was an *Astragalus* that had flowers only. It was misidentified as the closely related *A. giganteus* S. Wats., a species common in the region. The specimen was filed with that species at NMC until the error was discovered in 1986. This and more recent collections are: *Baltosser, s.n.*, Chihuahua, 2.4 km nw Colonia Juárez, 20 Apr 1979 (NMC); *Spellenberg, Corral, Muldavin, Brunt* 9163, 5 km nw of Colonia Juárez on the Río Piedras Negras, 8 Jun 1987 (BYU, ENCB, ESAHE, ISC, MEXU, NMC, NY); *Spellenberg et al.* 9178, 46 air km sw of Casas Grandes on the Río Piedras Verdes, 9 Jun 1987 (ENCB, ESAHE, MEXU, NMC, NY, RSA) (cytological voucher,  $n = 11$ ) (ESAHE represents the institution of Corral).

As far as is known, *A. hartmanii* is restricted to the drainage of the Río Piedras Verdes, where it grows under riparian vegetation of *Populus*, *Juglans*, *Fraxinus*, *Platanus* and *Salix* and on slopes along the river among *Quercus* and *Pinus*. This river flows past the old Hacienda San Diego, now part of a communal *ejido*, and the vegetation in area is very disturbed by domestic livestock. The only *Astragalus* found was the weedy *A. wootoni* Sheld. The river was used for access to the Sierra Madre by the Lumholtz Expedition, and the Hartman collection may have originated somewhat upstream from the hacienda headquarters. Much farther upstream, near the location documented by the collection *Spellenberg et al.* 9178, is the village known locally as "El Huili," but mapped as the *ejido* Ignacio Zaragoza. *Astragalus hartmanii* also occurs there as an occasional robust, ungrazed weed along the otherwise barren dirt streets.

The corolla of *A. hartmanii* is lemon-yellow, rather than "apparently



whitish" as surmised by Barneby from the old Hartman collection (GH, K, NY!). According to the label on the Baltosser specimen, the ascending flowers supply nectar to black-chinned hummingbirds. The flowers on the modern collections are about 85% the length of those on the Hartman collection, but the species will still key correctly in Barneby (1964) if lead 12 (p. 89) is modified slightly to read, "Flowers large, ascending, the banner  $\pm 3.2$  cm long, the petals yellowish." Plants attain 20–45 cm in height. The first peduncles form only 10–15 cm from the ground.

The heavy, developing pods of *A. hartmanii* often cause the raceme to lie on the ground, the humistrate pods then twisting on the thickened pedicel so that the tips are oriented upward. The pods were dry and still attached to the peduncles when we revisited the Colonia Juárez population in July. Pods are sessile, 15–35 mm long, 12–18 mm broad, and 8–10 mm deep, in profile varying from plumply ovoid to oblong, convex on the ventral surface when short, incurved through  $40^\circ$  when longer, rounded at the base, contracted distally into a short, triangular-cuspidate, laterally compressed, unilocular beak, otherwise bladdery-turgid, dorsiventrally compressed, shallowly sulcate dorsally, more openly sulcate ventrally, the sides rounded. The green valves are at first about 1 mm thick, lined on the inside with glistening hairs, drying to become at first very stiffly leathery, stramineous, faintly cross-reticulate and wrinkled perpendicular to the suture, and finally stiffly papery and blackish, lined within with an open white reticulum of collapsed cells, inflexed below the beak as a complete septum about 5 mm wide. Dehiscence is very tardy, the beak splitting and gaping slightly. Seeds are 2.7–2.8 mm long, brownish-black, smooth, dull.

Working only with Hartman's flowering material, Barneby (1964) proposed that the alliance of *A. hartmanii* was either with the sections *Sarcocarpi* because of the resemblance of the flower to *A. sanguineus* Rydb. or with the section *Mollissimi* because of habit and nature of pubescence (p. 1157). He also wrote (p. 750) that his monotypic section *Gigantei* may need expansion to include *A. hartmanii*, the two species being "somewhat similar in character." The three sections are sequential in his text and closely related, the *Sarcocarpi* differing from the others by pods that are usually very thick-walled and by the nature of the pubescence on the herbage. The large stature, the reflexed flowers, and the pods persistent upon the pedicels differentiate the *Gigantei* from the *Mollissimi*. As far as is known, a chromosome number of  $2n = 22$  occurs consistently in all three



sections (Spellenberg 1976); the number reported herein for *A. hartmanii* is consistent with this, but  $2n = 22$  also is found in many other North American sections and, therefore, in this instance is not a definitive indication of relationship.

The stiffly papery pod that lacks a well defined endocarp lining a thickly spongy mesophyll, combined with the pubescence of short curly hairs intermixed with a few longer straight ones, exclude *A. hartmanii* from the *Sarcocarpi*. However, the assignment of *A. hartmanii* to either of the other two sections is made with some difficulty, for the species combines several features from each. It tends to be mesophytic, and have a robust, leafy habit like *A. giganteus*, but it has the tendency to initiate peduncles near the ground, more characteristic of the *Mollissimi*. Its large, tumid, spreading-ascending, and often humistrate pods, stiffly papery at maturity, have more in common with the fruits of the *Mollissimi* (especially those of the *A. helleri* Fenzl in the subsection *Orthanthi*) than with the erect, leathery ones of the *Gigantei*, even though they are glabrous, mature to blackish, and tend to persist on the pedicel as in the *Gigantei*. The loosely-flowered racemes of 10–30 ascending flowers are also more similar to those of the *Mollissimi* than to the denser racemes of more numerous, declined flowers of the *Gigantei*. Within the section *Mollissimi*, *A. helleri* is also a robust plant with long, ascending (but red) flowers, and is probably hummingbird-visited. Features of its distinct flowers served to delineate the monotypic subsection *Orthanthi* (Barneby 1964, p. 747) from the also monotypic subsection *Mollissimi*, which contains only the widespread and variable *A. mollissimus*.

It is our belief that *A. hartmanii* by characteristics of its flowers, pubescence, and pods, belongs in the section *Mollissimi*. It then is placed somewhat less certainly as the second species in the subsection *Orthanthi*, the technical description of the section necessarily needing expansion to include yellow flowers. It is unlikely that the two species have an exact common ancestor subsequent to the radiation of section *Mollissimi*, for *Astragalus helleri* occurs only on Mt. Orizaba in central Mexico. Compared to it, *A. hartmanii* may be viewed as a parallel modification from ancestral types akin to less specialized forms now in the variable subsection *Mollissimi*, differing conspicuously from *A. helleri* by its much sparser pubescence, yellow flowers, and glabrous pod.

#### ACKNOWLEDGEMENTS

We express our appreciation to Rupert Barneby for an early reading of



this manuscript, for aid in the identification of some specimens, and for his help with the location of the probable site of the type locality of *A. hartmanii*. - Richard Spellenberg, Dept. Biology, New Mexico State Univ., Las Cruces, NM 88003 - 0001, and Rafael Corral Diaz, Colegio de Graduados, Escuela Superior de Agricultura "Hermanos Escobar," Cd. Juárez, Chih., Mexico.

## REFERENCES

- BARNEBY, R. 1964. Atlas of North American *Astragalus*. Mem. New York Bot. Gard. 13 (pts 1 & 2):1 - 1188.  
 SPELLENBERG, R. 1976. Chromosome numbers and their cytotaxonomic significance for North American *Astragalus* (Fabaceae). Taxon 25:463 - 476.

*CYPERUS DIFFORMIS* L. (CYPERACEAE) NEW TO TEXAS—*Cyperus difformis* L. is a weedy annual sedge, native to Eurasia, that is now widespread in Central and North America. Lipscomb (1980) discussed the distributional history of this species in the New World and listed its occurrence in California, Arizona, Oklahoma, Louisiana, Alabama, Virginia and North Carolina as well as in Mexico and Nicaragua. Webb and Dennis (1981) have since reported it from Tennessee, and Lemaire (1970) listed an unusual occurrence from Nebraska.

*Cyperus difformis* was first collected in Texas in 1981 and is now known from about twenty sites in the Austin-Round Rock area of Travis and Williamson counties. At many of these sites, *C. difformis* occurs in perennially wet mud in very shallow water over limestone or dolomite in unshaded creek beds, especially where these streams have been recently channelized or otherwise disturbed; it occurs less frequently on creek banks and lake shores, and has also been collected from a small drainage ditch, a wet lawn, and from the cracks in an asphalt parking lot. Since *C. difformis* turned up in 1988 at several sites where it was sought and not found in earlier years, and since it is now present in two major Texas river systems (the Brazos and the Colorado), this aggressive sedge can be expected to spread to disturbed wet habitat in other parts of Texas and to remain as a persistent member of the state flora.

Specimens collected: TEXAS: Travis Co.: Colorado River at US Rt. 183, 1 Oct 1981, Carr 3437 (TEX), 26 Oct 1981, Carr 3604 (SMU, TAMU); Bull Creek N of Loop 360, 0.6 mi NE of Lakewood Dr., 9 Oct 1981, Carr 3511 (TAMU), 13 Aug 1982, Carr 4207; 5 Sep 1982, Carr 4282 (SMU, TAMU); Town Lake at Loop 1, 6 Sep 1982, Carr & Wade 4293 (SMU); Bull Creek, Lakewood Dr. at Loop 360, 21 Sep 1986, Carr & Price 7840 (TAMU); 1 Aug 1988, Carr & Price 9099; roadside ditch and parking lot, Krieg Fields, Austin, 16 Sep